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ABSTRACT

A comparative curriculum analysis was performed of the associate degree, electronics engineering technology programs of the DeVry Institute of Technology (DIT), a corporation-owned proprietary school in Illinois, Lake Superior State College (LSSC) in Michigan, and Mesa Community College (MCC) in Arizona. The curricula were compared in terms of curriculum characteristics (i.e., entrance requirements, accreditation, length of program, instructional methods, scholastic standards, and tuition costs); general education requirements; and requirements in technical courses. The study revealed that: (1) entrance requirements were similar at all three institutions, with MCC having the least restrictive requirements; (2) all three institutions were accredited by their regional association; (3) the program at DIT was almost twice as long as the other two; (4) all three programs employed the traditional lecture method with some laboratory work; (5) tuition costs were lowest at the MCC; (6) DIT required proportionally more units of technical and electronics courses and placed a greater emphasis on mathematics than the other colleges; and (7) general education requirements were similar at all three schools. Study conclusions emphasize the similarity among the three associate degree programs and the unexpected breadth in the curriculum of the corporation-sponsored school. (HB)

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A Comparative Curriculum Analysis of an Associate Degree Program at a Corporation School, a State College and a Community College

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A current topic among many educators today is the activity of business in education. Numerous articles have surfaced in the last few years documenting these activities and posing questions about the future of traditional post-secondary education (Brickell and Aslanian 1981; David 1977; Doll 1980; Hodgkinson 1980; Maeroff 1981). In some cases businesses provide more than on-the-job training for employees; some firms have extensive in-house educational programs that cover a variety of topics (Lusterman 1977; Serbein 1961; Clark and Sloan 1958). Also, in a few instances degrees are being awarded for completion of these educational programs (Brazziel 1981; McQuigg 1980; Porter 1982).

Examination of this type of education in general reveals that proprietary education can be classified in two categories. The first category includes schools or programs created to educate corporate personnel in or for that corporation only. One would expect the education thus provided to be completely specific or useful to that firm only (Becker 1975). The second category includes schools or programs not limited to corporate personnel and created to provide general training which is described by Becker (1975) as training which is equally useful in many firms. Frequently these schools or programs are operated for a profit.

One major United States corporation which has identified postsecondary education as a profitable enterprise is

the Bell and Howell Company. Through a wholly-owned subsidiary, the Bell and Howell Education Group, Bell and Howell owns and operates a network of nine residential schools in the United States and Canada. Bell and Howell entered the field of education as a profit-making venture when it bought DeVry Institute of Technology in 1967. The DeVry Institute was described as "a Chicago training ground for electronic technicians" and Bell and Howell was to use it "as a base to open more technical schools" ("A Hard Target," 1968, p. 73). The Bell and Howell schools have as primary goal "to offer quality curricula" (DeVry Institute of Technology Academic Catalog 1982, p. 7) rather than to train personnel for the Bell and Howell company.

The fall 1981 enrollment in these schools totalled over 20,000 students. DeVry Institute of Technology in Phoenix, Arizona is one of these schools and had an enrollment of 4,550 students in November of 1982. DeVry offers four degree programs (associate and bachelor's in both electronic engineering technology and computer science for business) as well as diploma and technician programs in the same fields. The programs in electronic engineering technology have been offered since 1967; the programs in computer science for business were added in 1979.

How do the degree programs of a corporation-owned proprietary school compare with more traditional collegiate programs? To answer this question, a comparative curriculum analysis was performed on one of the degree programs offered

by DeVry Institute of Technology. The DeVry curriculum in electronic engineering technology was compared to two other associate degree programs in the same field, one at Lake Superior State College (Michigan) and one at Mesa Community College in Arizona.

For purposes of analysis, the curriculum was separated into three areas: curricular characteristics, curriculum requirements general education, and curriculum requirements technical courses. The area of curricular characteristics was further subdivided into six topics on which comparisons could be made. These topics were entrance requirements, accreditation, length of program, instructional method, scholastic standards, and cost of full-time tuition. Table 1 sets forth these characteristics and the particulars for each institution with regard to these characteristics.

As can be seen from Table 1, entrance requirements are similar among the three institutions. The community college has the least restrictive requirements in accordance with the mission and philosophy of that type of institution. All three institutions are accredited by their regional association. The electronic engineering technology programs at both DeVry and Lake Superior State College are also accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology. In addition, the program at DeVry is accredited by the Accrediting Commission of the National Association of Trade and Technical Schools. The program at DeVry is almost twice as long as the other two,

Table 1: DeVry Institute of Technology (AZ) Associate's Degree in Electronic Engineering Technology--Curricular Characteristics.

Characteristics	DeVry Institute of Technology	Lake Superior State College (MI)	Mesa Community College (AZ)
Entrance Requirements	1. at least 17 years old 2. high school graduate or equivalent 3. pass entrance/placement exam or submit SAT math score of 480+ or ACT math score of 23+	1. high school graduate 2. ACT test 3. high school entrance units 1 unit beginning algebra 1 unit geometry 1 unit lab science (chem/phys) 3 units English	1. high school graduate or equivalent 2. persons 18 yrs old or over meeting district criteria for potential success in the comm. col.
Accreditation	North Central Association of Colleges & Schools Accreditation Board for Engineering & Technology National Association of Trade & Technical Schools	North Central Association of Colleges & Schools Accreditation Board for Engineering & Technology	North Central Association of Colleges & Schools
Length of Program	7 trimesters	6 quarters	4 semesters
Length of Term	15 weeks	10 weeks	16 weeks

Table 1, Continued

Characteristics	DeVry Institute of Technology	Lake Superior State College (MI)	Mesa Community College (AZ)
No. of units required	124 semester units	64 semester units	68 semester units
Instructional method	lecture/laboratory	lecture/laboratory	lecture/laboratory
Cost of Full-Time Tuition per Term	$1,515 (1st trimester) $1,465 (2nd trimester) $1,370 (3rd-8th terms)	$1,059 (state residents) $2,067 (non-residents)	$132 (state residents) $1,257 (non-residents)
Total for Program	$9,830	$6,354 (state residents) $12,402 (non-residents)	$528 (state residents) $5,028 (non-residents)
Scholastic Standards Grade Point Average	placed on probation if below 2.0 suspended after 4 terms on probation 2.0 (C) required for graduation	graduated scale of min. GPA to remain in good standing by no. of hours of coursework attempted 2.0 (C) required for graduation	must maintain a 1.6 or better to be in good standing 2.0 (C) required for graduation
Transfer Credit	accepted, when applicable, with grade of C or better	accepted from accredited institution with grade of D or better	accepted from accredited institution with grade of C or better

seven trimesters of fifteen weeks each compared to six quarters of ten weeks each and four semesters of sixteen weeks. As would be expected, the number of units required is also nearly double. All three programs employ the traditional lecture method of instruction with some laboratory work. Tuition costs for full-time students are least at the community college for state residents ($132 per term), although out-of-state tuition ($1257) is more closely aligned with Lake Superior State resident tuition ($1059) and DeVry tuition after the second trimester ($1370).

Scholastic standards include a required grade point average of 2.0 (C) for graduation which is common at all three institutions. However, further scholastic standards for remaining in good standing at each institution show considerable variability. Mesa Community College requires that students maintain a 1.6 (on a 4-point scale) grade point average while Lake Superior State College has a graduated grade point average (GPA) scale related to the number of hours of coursework attempted -- a 1.8 is the minimum average required. DeVry appears to have the most stringent academic standards because that institution places any student on academic probation when his/her grade point average falls below 2.0.

Transfer credit is accepted from other institutions by all three of the schools listed in Table 1. DeVry and Mesa stipulate that grades earned must be C or better while Lake Superior State College will accept courses in which grades

of D were earned. DeVry further stipulates that the courses must be applicable to their program.

An attempt was made in Tables 2 and 3 to separate the specifically-required courses of each electronic engineering technology curriculum into a few common components. These components were grouped primarily in two broad categories, general education courses and technical courses. The general education category is further divided into the areas of communications, social and behavioral science, physical science, health and physical education, and humanities. For the most part, the catalogs of these institutions did not show the curriculum displayed in this manner, however, this classification provided an effective framework for comparison Moreover, all unit values were converted to semester units for ease of comparison.

Upon initial inspection Table 2 appears to indicate that DeVry Institute of Technology requires considerably more in the way of general education courses than the other two institutions. However, when the length of the program is considered, the proportion of the curriculum that is categorized as general education accounts for 23 percent of the program, which is the same proportion of general education courses required at Mesa Community College. In actuality, Lake Superior State College requires the highest proportion of general education courses (29 percent).

Students in all three programs are required to take

Table 2: DeVry Institute of Technology (AZ) Associate's Degree in Electronic Engineering Technology Curriculum Requirements--General Education.

Curriculum	DeVry Institute of Technology	Lake Superior State College (MI)	Mesa Community College (AZ)
General Education	28 semester units	18.67 semester units	16 semester units
Communications	10 units English (3 units) Tech. Writ. (3 units) Public Spkng (4 units)	6 units English I (2 units) English II (2 units) Report Writ. & Spch (2 units)	6 units English I (3 units) English II (3 units)
Social and Behavioral Science	8 units Economics (4 units) Organ'l Psyc (4 units)	2.67 units U.S. Constitutional Gov't (2.67 units)	6 units courses selected from published list
Physical Science	10 units Physics I & II	8 units Physics I, II, III	(6 units) electronics courses from major satisfy
Health/Physical Education	None Required	2 units First Aid Physical Education	2 units Physical Education
Humanities	None Required	None Required	2 units

at least two courses in communications including a basic course in English composition. Skill in technical writing and public speaking is developed in two required courses (one in each area) at DeVry Institute. At Lake Superior State College these two topics are combined in a single required course in report writing and speech. The second of two required communications courses at Mesa Community College is selected from an eight-course list which includes a course in technical writing as well as a speech course.

With respect to requirements in the social and behavioral sciences, all students at DeVry Institute complete an introductory course in economics, including both micro- and macroeconomics, and an introductory psychology course which includes such topics as learning, perception, emotions, motivation, and social psychology. Two courses in the social and behavioral sciences are also required of students in the electronic engineering technology program at Mesa Community College. However, the students at Mesa may take any two courses from an extensive list of courses identified as social and behavioral sciences. Students at Lake Superior State College are required to take a single course, entitled United States Constitutional Government, which is classified with social and behavioral science in Table 2.

Students at DeVry Institute of Technology become familiar with methods and techniques of the physical sciences through two required physics courses which constitute ten

semester units including laboratories. Similarly, students at Lake Superior State College are required to complete three quarters (eight semester units) of physics including laboratories. The Mesa Community College catalog states that for electrcnic engineering technology students the six semester unit physical science requirement is satisfied by any electronics courses from the major.

Unlike students at Lake Superior State and Mesa Community College, students at DeVry Institute of Technology are not required to take any courses in health or physical education. Moreover, the program in electronic engineering technology at Mesa Community College is the only one of the three examined here to include a requirement in the humanities. Students in the program at Mesa Community College must select one course in humanities (minimum of two semester units) from a specific list of such courses.

The technical portion of the curriculum (see Table 3) consists of courses in drafting, mathematics, digital circuits, computer programming, electronics, and electives. Proportionally, DeVry requires the most units of technical courses (77 percent) followed by Mesa Community College (76 percent) then Lake Superior State College (71 percent). All three programs require one course in drafting as well as mathematics courses that include algebra and trigonometry. DeVry and Lake Superior State College further require courses that include calculus. In addition, the curriculum at DeVry

Table 3: DeVry Institute of Technology (AZ) Associate's Degree in Electrical Engineering Technology Curriculum Requirements—Technical Courses.

Curriculum	DeVry Institute of Technology	Lake Superior State College (MI)	Mesa Community College (AZ)
Technical Courses	96 semester units	45.33 semester units	52-53 semester units
Drafting	1 unit	2 units	3 units
Mathematics	24 units Algebra & Trig I & II (10 units) Calculus I & II (10 units) Differential Equations (4 units)	8 units Applied I, II, III (Algebra, Trig., Geom., Calculus)	9 units Math for Electronics (6 units) Calculus I (3 units)
Digital Circuits	10 units	6.66 units	4 units
Computer Programming	3 units (high-level language)	2 units (BASIC)	None Required
Electronics	58 units Circuit Analysis (11 units) Elect. Devices & Cir. (15 units) Linear Circuits (10 units) Control Systems (5 units) Communication Systems (10 units) Digital Computers (5 units) Electronics Laboratory (2 units)	?? units Circuit Analysis (2 units) Elect. I, II, III (10 units) Elect. Circuits (3.33 units) Elect. & Magnetism (3.33 units) Elect. Machinery (3.34 units)	27-28 units Active Circuits (8 units) Semiconductor Elect. (4 units) Elect. Intro. I & II (7-8 units) Communication Systems (4 units) Measurement & Instru. (2 units) Fabrication Tech. (2 units)
Electives	None Required	4.66 units Unspecified	9 units Electronics & Physics

Institute of Technology reflects an emphasis on mathematics and requires a course in differential equations for a total of twenty-four required units in mathematics. One or more courses in digital circuits is required in all three programs and DeVry Institute and Lake Superior State College both require a course in computer programming.

As might be expected, DeVry Institute of Technology exhibits the highest proportion of courses classified as electronics in the technical portion of its curriculum. Sixty percent of the technical courses at DeVry are classified as electronics compared with 52 percent at Mesa Community College and 49 percent at Lake Superior State College. There are many similarities among the course titles and descriptions of the electronics courses in all three programs. Common subject-matter areas include electronic circuits, semiconductor electronics, communications systems, circuit analysis. and fabrication techniques. The length of the program at DeVry Institute allows students more concentration in the above-mentioned areas as well as education in more specialized areas.

Students in the electronics engineering technology program at Mesa Community College are required to choose nine units (three courses) of electives from six courses in electronics and physics. Students in the program at Lake Superior State College are required to take the equivalent of 4.66 semester units of electives in no specific area.

The program at DeVry Institute of Technology has no elective requirement.

From this analysis it can be seen that the similarities among the three associate degree programs in electronic engineering technology are greater than their differences. In fact, most of the differences in course requirements can be attributed to the fact that the program at DeVry Institute of Technology is almost forty-five weeks longer than either of the other two programs. This allows time for more concentrated study in the area. The variances in curricular characteristics are few and can be explained primarily by differences in institutional type (mission). More specifically, the most striking differences (other than length of program, see Table 1) are in the areas of entrance requirements and cost. The least restrictive entrance requirements and the lowest tuition costs are found in the community college which has as its principal mission the provision of low-cost education to the community.

Thus it appears that the degree program of a corporation-sponsored school is not so different from more traditional programs. A surprising breadth is noted int he curriculum which includes courses in communications, behavioral and social science, natural science, and mathematics in addition to technical courses. The hidden curriculum (see Levine 1978, p. 526) is also in evidence at DeVry Institute of Technology. A variety of professional, social,

and recreational activities and clubs provide opportunities for students and faculty to interact. The Student Association sponsors activities and athletics and the DeVry newspaper offers students additional opportunities to develop their communication skills.

It is therefore concluded that the associate degree program in electronic engineering technology at DeVry Institute of Technology is a substantial educational program with many similarities to traditional collegiate programs. The existence of this program and others like it add to the diversity of American higher education.

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